1，To evaluate under Tufte's objective of maximizing the data-ink ratio:

From Tufte’s objective of maximizing the data-ink ratio, I think the first graph is a rather good visualization (although it still contains some elements that can be deleted under Tufte’s very strict standards, for example the frame around the text at bottom right, and the text “year” at the bottom – everyone can recognize the numbers on the x-axis are years). Each of the element contains some quantitative information: if we delete them we may lose some signals from the data. For example: different colors represent different sources of temperature info; x-axis shows the year; y-axis shows the departure from 1961-1990 average. This picture does so well that not a single piece of text is redundant. Tufte would love this picture.

However, the second picture goes against Tufte’s principles in nearly every aspect. Many inks in this figure does not contain any quantitative information, but is used just for aesthetic reasons. For example, it has different colors for each column to show the differences in temperature: however, this is redundant because the number on the x-axis has shown the different temperatures. The texts and small pictures in the figure tells many interesting stories about people’s living experiences in each era: however, they are not quantitative, statistical information—the quantitative part of the story can be presented by a number on the y-axis. The font of the text is also cute but not functional—Tufte would love standard font instead of this beautiful one.

To sum up, from Tufte’s principle to maximize the data-ink ratio, I think the first figure is much better than the second one—it is more simple, clear, scientific, and less redundant.

2, Evaluate both graphs under Alberto Cairo’s five characteristics of data visualizations.

2.1 Is it truthful?

For this question, I assume that the data sources for both pictures are reliable. If so, I guess both figures are truthful—although the first one is easier to read and present the information in a more organized way.

2.2 Is it functional?

Yes—I think both figures are functional. Both figures convey the information to the readers, and can provide support to the main arguments.

However, they may serve different purpose and are functional in different senses. The first figure is a scientific figure, which may serve well in a scientific report and a publishable manuscript. However, if it appears in a magazine, it would drive away many readers because it is a little boring. The second figure contains many interesting stories and beautiful interface, which makes it perfect for magazine or other public media. It will make the readers excited. However, it is extremely inappropriate in more serious publications, like science journals, government reports, etc. It is not simple and clear enough to convey the most important info in a short time.

2.3 Is it beautiful?

Yeah—from my personal perspective both are beautiful, and I like the first one a little more because I love these well-arranged academic stuffs. However, some other people will think the second one is more beautiful—it is more colorful, contains more vivid information, and has a more reader-friendly atmosphere.

2.4 Is it insightful?

Both are insightful. The first figure helps us to think about the different between different data sources of historical temperature, and the general trend of historical temperature change. The second figure allows us to get a better understanding of human experiences in different eras with different temperatures. Both figures convey some useful and interesting information that allows us to explore relevant topics.

2.5 Is it enlightening?

Yes—I guess both are enlightening, but in different ways. The first allows us to think about different features of different data source: why tree rings/corals/ice cores have much more fluctuations than historical records? Is it because of the technological limitations of human beings, or other reasons? The second figure allows us to think more about human experiences in each time period. What is the relationship between temperature and the life quality of humans? Will temperature have any influence on our future benefits?

3, Which graph do you prefer? Under what circumstances would you select one graph over the other?

That depends on the scenarios. If I am writing a scientific paper or government report about temperature change, I would certainly use the first one—the second one would lead to desk rejection because it is not simple and clear enough. However, the second one would be much better than the first one for a website, magazine, or brochure. It is more attractive and colorful, which makes it easier to attract more readers.